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EDUCATION FOR HOSPITAL LIBRARY PERSONNEL, CONTINUATION OF FEASIBILITY STUDY FOR CONTINUING EDUCATION OF MEDICAL LIBRARIANS. INTERIM REPORT NO. 2

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This survey of Ohio hospitals and their libraries was a preliminary task in the design, implementation and evaluation of a comprehensive program of continuing education for hospital library personnel. Two basic issues explored in this report are the co-occurrence of hospital libraries and particular hospital functions and the possibility of predicting the existence and level of operation of a hospital's medical library from information regarding the functions of patient care, research, and education. Data were collected from the Annual Hospital Registration Forms submitted to the Ohio Department of Health by each hospital and from a questionnaire survey of all hospital administrators. Part One summerizes data relating to the primary hospital functions in various Ohio hospitals and Part Two discusses the present status of Ohio hospital libraries. (CC)

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Continuation of

FEASIBILITY STUDY FOR

CONTINUING EDUCATION OF MEDICAL LIBRARIANS

OCT. 29. 1968

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Period covered: January 16, 1968 - June 20, 1968
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JULY 16, 1968

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SYNOPSIS

The survey of Ohio hospitals and hospital libraries described in this report constituted a preliminary task in the design, implementation and evaluation of a comprehensive program of continuing education for hospital library personnel. The research methodology involved the formal conceptualization of the role of the library within the hospital organization and the construction of data banks of information relating to three basic hospital functions--patient care, training and research; and the gathering of data concerning facilities, resources and services of hospital libraries and personnel.

Two issues were of basic interest: the co-occurrence of hospital libraries and particular hospital functions; and the possibility of predicting the existence and level of operation of a hospital's medical library from information regarding the functions of patient care, research and education. The design of the research project is based upon the fundamental assumptions that the hospital library located within the hospital environment is, or ought to be, engaged in a series of interactions with each of the primary hospital functions, taken separately and in combination, and that the resources, facilities, services and the personnel of the library should be observed and evaluated within this series of relationships. These relationships will be explored again in much greater depth when information regarding the actual budgets, user populations, usage patterns, facilities, resources, personnel, etc., of the libraries surveyed has been codified and prepared for analysis.

This report summarizes and analyzes data drawn from the Annual Hospital Registration Form submitted to the Ohio Department of Health by each hospital and from a questionnaire survey of all hospital administrators. Part one summarizes data relating to the primary hospital functions of patient care, research and education as they occur and co-occur in various Ohio hospitals with discriminations made by hospital size and geographic location. Part two discusses in a preliminary manner the present status of Ohio hospital libraries. These libraries have been separated into two groups on the basis of the existence of personnel (either full-or part-time) in the library. Functional libraries are defined as libraries reporting personnel actually performing library tasks; and non-functional libraries are defined as libraries reporting administrative personnel (physicians, etc.) nominally in charge of the library, but with no personnel actually committed to the performance of library tasks. The occurrence and co-occurrence of various hospital functions with the existence of functional libraries is discussed in depth.

Of the 227 Ohio hospitals included in the survey, 154 (67%) were determined to have functional libraries and 73 (33%) to have non-functional libraries. The findings indicate that 20% of those hospitals having at least one training program of any kind do not have functional libraries and 12% of the hospitals with AMA or AOA internships or residencies also do not have functional libraries. Active research programs within a hospital appear to exert a stronger influence on the existence of a functional library than do the presence of training programs. Hospitals having both research and training programs almost always have functional libraries.

An attempt was made to measure the level of development of a functional library by specifying the number of criteria met by that library. These criteria measured personnel, budget, hospital accreditation, etc. It was found that bed size was the most crucial variable in determining the level of the development of a library (as it is also in determining the scope of a hospital's patient care, research and training programs). In addition, it was observed that functional libraries occurring in hospitals reporting active research and training programs met a significantly greater number of criteria than did functional libraries in the total experimental population. The average functional library surveyed met 3.1 criteria; functional libraries in hospitals reporting research programs met 3.6 criteria; libraries in hospitals reporting training programs met 3.5 criteria; and libraries in hospitals reporting research programs and AMA/AOA training programs met 3.7 criteria.

Approximately one third of all Ohio hospitals, since they lack library facilities, are not tied into the formally organized biomedical information networks, both regional and national, although some of these hospitals have activities which would warrant inclusion in such a system.

In addition, a preliminary analysis of detailed information relating to the current status of functional libraries and their personnel indicates that most of these libraries operate at a minimal level. From these data it is apparent that persons involved in upgrading communication, both formal and informal, within the hospital setting, such as coordinators of Regional Medical Programs and of Regional Medical Library Programs in Ohio, must address themselves to the task of upgrading the hospital library system.

I. INTRODUCTION

Over the past several years an increasing amount of attention has been focussed upon the national system for the delivery of health care, and in particular, upon the hospitals through which the system operates. This interest in the health care system and in its component elements -- hospitals, medical schools, research centers, clinics, etc. -- has been a product of an increasing concern with the current level of patient care services readily available and accessible to the majority of the U.S. population. Paralleling this interest in increasing and extending the range of patient care services is a complementary concern with the types, levels and extent of education aimed at increasing the number and up-grading the quality of professional and paramedical health manpower. Predictions suggest that the health industry will become the nation's largest employer by 1975, in view of the impact of Medicare, Medicaid and other factors and the evolving manpower crisis is now most evident. The National Advisory Commission of Health Manpower has pointed out that the health care system, and energies to pursue these interests have been centralized, formalized and funded in Regional Hospital Boards and in Regional Medical Programs.

One of the major results of the programs to extend and to upgrade the level of the nation's health care system has been the recognition of the crucial role to be played by a functioning network of health science libraries in the flow of biomedical information. In this connection, the role of the medical library, within the information network has yet to be adequately specified. It is clear, however, that the hospital library must bear the initial burden of transferring recorded information from the producer (the researcher) to the user (the attending physician or student).

The hospital library, therefore, occupies a special position. The paramount importance of functioning hospital libraries has been recognized by the Federal Government in the Regional Medical Library Programs and by many persons engaged in developing Regional Medical Programs. Of particular interest to such persons is a clearer definition of the role of the library in the hospital system, and of the place of the hospital library in relation to regional and other resource libraries located in university medical centers and elsewhere.

Although the potential role of hospital-based medical libraries is recognized and despite an awareness that the overwhelming majority of libraries are not functioning as efficient channels of communication, effective upgrading has been hindered by a lack of reliable data. In particular, data are lacking with reference to a detailed description of operational hospital libraries and to an adequate conceptualization of the role of the hospital library within the total hospital system and within the Regional Medical Programs of the National Library of Medicine.

The purpose of this technical report is to present and to analyze data describing the health care functions of patient care, research, and training programs within Ohio hospitals. The data is summarized into profiles based on bed increments, and these profiles are discussed and analyzed in terms of their relationship--actual and projected--to the hospital-based medical library.

The principal objective of the research project described in this report is the design, implementation and evaluation of educational programs for hospital library personnel both at the professional and non-professional levels. Considerable attention has been paid in the research design to the problem of describing the total hospital system with reference to information needs. The relationships, both actual and potential, between the library and the patient care, education and research functions of the hospital have been isolated and described. These are of fundamental interest since the services of the library constitute a significant input to each of these functions.

The conceptualization of the hospital library as part of the hospital system and responding to basic hospital functions implies the active participation of the library in each of the hospitals functions. Also, it implies that the library should be organized in a manner most likely to provide informational support and that library personnel should be competent to furnish such support. It is also obvious that no hospital library can be a self-sufficient and independent entity isolated from regional and national bibliographic resources. Rather, the library must be developed as part of a network and should draw upon the resources of other more complete library facilities and resources located in medical schools and regional centers. Although the library's collection need only be able to satisfy immediate and urgent user needs, its personnel should be competent to exploit the resources of other libraries in order to obtain less pressing information.

Particular attention has been paid in this research project to both the role of the library within the hospital and the relationship of the hospital library to regional resource libraries. The findings of the research will be of particular interest both to hospital administrators concerned with the development of libraries within their institution and to the co-ordinators of Regional Medical Programs (RMP) and Regional Medical Library Programs (RMLP).

Considerable effort has been devoted to gathering data concerned with patient care, education and research programs in Ohio hospitals in order to determine the nature and extent of the relationships existing between the hospital libraries and these programs. The design and implementation of appropriate educational programs for library personnel will be based upon analysis of this body of data. Due to incomplete public information an extensive survey of Ohio hospitals has been necessary. This survey effort has been executed in three parts:

a) Survey of hospitals to determine the nature of patient care, research, and educational offerings.

b) Survey of the hospital-based medical libraries to determine the extent and types of library service provided.

c) Survey of hospital library personnel to determine their educational background and job experience.

The present report is primarily concerned with analysis of the findings of the first component identified above. Subsequent reports will present an analysis of the facilities and resources of the libraries and library personnel.

Two principal sources of information have been utilized in this report: the Annual Hospital Registration Form of the Ohio Department of Health and a Questionnaire directed towards all hospital administrators. Data have been gathered with respect to the following hospital functions:

a) Patient Care

---organized medical services within the hospital.

---organized clinics in out-patient departments.

---facilities and services.

---personnel (total personnel and breakdown by direct patient care categories).

b) Research

---number of staff involved

---number of research programs (conducted independently and conducted in conjunction with another institution)

---subject areas involved

---budget size

c) Education

---number of AMA-approved interns and residents, positions, and the specialties concerned

---kinds of continuing education programs offered to the hospital's professional staff and numbers of persons attending

---all other educational programs (e.g., Nursing, etc.)

---names of directors of education (DME)

d) Medical Library

---person responsible for carrying on library operations

---budget

---existence of library committee

The emphasis in this report, as in the total research effort, has been to define the present status of hospital libraries in Ohio in relation to the basic hospital functions which they are established to support and to describe in some detail the environment in which these libraries operate. This task has been seen as a necessary step in the design and implementation of educational programs appropriate to the task of upgrading hospital library practice. In this manner, some formal definition will be attempted of what hospital libraries do, or should do, within the context of institutional (i.e., hospitals) goals.

II. PROFILES OF THE OHIO HOSPITAL SYSTEM

A. Research Design

The objective of the research design was to compile a comprehensive data bank regarding:

(i) the hospital-based health care system in Ohio in terms of the patient care, research and educational functions,

(ii) the present status of hospital-based medical libraries,

(iii) the personnel presently employed in hospital libraries.

To obtain this data, a questionnaire-based survey of all hospitals within the state was undertaken. The data gathering involved three instruments:

(i) A Questionnaire directed to hospital administrators relating to information not available from the Annual Hospital Registration Form filed with the Ohio State Department of Health.

(ii) A Questionnaire directed to the chief librarian, as identified by the administrator, relating to library facilities, resources and services.

(iii) A Questionnaire directed towards all library personnel relating to their education and work experience.

B. Survey Population

The total population consisted of 297 hospitals identified through the Ohio Department of Health and the American Hospital Association's List of Health Care Facilities (1967). This population included long-and short-term institutions, federal, state, municipal and private institutions, and general and special care institutions. Two hundred and twenty-seven hospitals are included in this analysis of the hospital health care system. Fifty institutions were deleted for one of the following reasons:

(i) Annual Hospital Registration Reports had not been filed with the State.

(ii) Failure to return the Administrator's Questionnaire.

(iii) Hospital was not an independent institution, and was subsequently combined with its "parent" institution.

(iv) Hospital did not qualify as having a Medical Library on the basis of at least one of the following criteria:

  (a) Accreditation by the Joint Commission on Hospitals

  (b) Reported having a Medical Library

  (c) Indicated having a Medical Library budget

  (d) Responded as having a Medical Library personnel*

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*Items b,c, and d taken from the Annual Hospital Registration Report and the Administrative Questionnaire.

Data relating to these 227 hospital health-care systems were obtained from the Annual Hospital Registration Report filed with the State and from a questionnaire directed to all hospital administrators. A 98% return was achieved on this questionnaire*.

C. Analysis Procedure

The objective of the analysis of data relating to the hospital health care system was characterized by the total Ohio hospital system in terms of patient care, research and education functions. To achieve this characterization, hospital profiles, based on bed size are presented.

For purposes of analysis the 227 hospitals in the experimental population were divided into two experimental sub-populations so that more homogeneous groupings might be obtained. The two sub-populations are:

(i) General Hospitals (long-and short-term)

(ii) Non-general Hospitals (long and short-term, including tuberculosis, pediatric, geriatric, obstetric-gynecology, rehabilitation, ear, eye, nose and throat, Veterans Administration, homes)

Hospitals were also divided by bed increments reflecting the assumption that bed size is a determining factor in development of hospital programs. Although six bed-increments were originally established, the analyses presented below were performed on combined categories thereby increasing the "N." These combined bed increments are 25-175, 176-325, 326-2000.

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*A detailed discussion of the Research Design and samples of the Questionnaire, cover letters, etc., are presented in Feasibility Study For Continuing Education of Medical Librarians, Interim Report., June 1, 1967-January 15, 1968.

All data were keypunched and summarized on computer. Control printouts are available by hospital code number and by hospital bed size.

The profiles presented as a result of this analysis are descriptive rather than statistical in nature. This approach was adopted since it provided a level of analysis adequate to the project's needs and also avoided the problem of unequal N's.

A summary and discussion of the data gathered in relation to each of the three hospital functions -- education, research and patient care -- is presented below. This is followed by an analysis of the data on the basis of bed increments; profiles of each increment are presented in terms of the three hospital functions. The total Ohio hospital population is also summarized in relation to each function, without discrimination by increments. Finally, significant correlations between these factors are discussed.

D. Profiles by Function

1. Education Functions: Data for this section have been gathered through the Annual Hospital Registration Form and the Administrator's Questionnaire. Information as to the types and numbers of training programs offered by (and at) hospitals is presented below.

The purpose of these analyses is twofold: first, to summarize data on the numbers and kinds of training and continuing education programs offered through hospitals; and second, to draw inferences from the data as regards the relationships between these programs and the hospital's medical library in terms of actual and potential demand for library services.

It is evident that the number and variety of training programs offered by hospitals within the total experimental population increases in proportion to the number of beds. This relationship is shown in Table 1 for the total experimental population; Appendix A provides this data for each sub-population (i.e., General hospitals and Specialty hospitals).

Some 397 training programs are offered in the 227 hospitals. However, only 14% of the programs occur in hospitals having less than 175 beds; and an additional 28% occur in hospitals having 176-325 beds. Fifty-seven percent of all training programs occur in hospitals having more than 326 beds. This percentage distribution is also true for each of the experimental sub-populations, as shown in Table 2.

It is also interesting to note that training programs tend to occur in clusters. That is, most hospitals having training programs have two or more programs. The data shows that 120, or 53%, of all hospitals surveyed in the state of Ohio offer no training programs. The 397 training programs occur in 107 hospitals, giving each hospital an average of 318 programs. Table 3 shows the number of hospitals offering one, two, three, etc. training programs.

Bed Increments Programs	25-175[2]	176-325[3]	Over 326[4]	Total
Nursing	5	18	34	57
Intern	3	16	34	53
Resident	9	17	35	61
Cytotechnology	0	2	7	9
Dietetics	0	1	8	9
Inhalation Therapy	0	1	5	6
Medical Records	0	0	3	3
Medical Technology	8	10	28	46
Hospital Administration	1	3	10	14
Nurse Anesthetics	0	1	2	3
Hospital Pharmacy	1	4	7	12
X-ray	12	17	29	58
Practical Nursing	16	22	28	66

[1] Includes 227 hospitals
[2] Includes 142 hospitals
[3] Includes 40 hospitals
[4] Includes 45 hospitals

Table 1

Frequency of Various Training Programs
in the Total Experimental Population,[1] by Bed Increments

Experimental Population / Bed Increment	Total	General Hospitals	Specialty Hospitals
25-175	14%	14%	15%
176-325	28%	28%	36%
Over 326	57%	58%	48%

Table 2

Percentage Distribution of Total Number of Training Programs in the Experimental Populations, by Bed Increment.

Number of Training Programs Offered	Number of Hospitals Offering this Many Programs
1	31
2	16
3	10
4	10
5	9
6	12
7	11
8	6
9	1
10	0
11	1

Table 3

Clustering of Training Programs

Of special interest to this project in regards to the clustering* of training programs in given hospitals is the types of programs, which tend to appear together. For example, hospitals tend to have resident and intern programs rather than resident or intern programs. If library services are considered as a necessary input to the educational function, then this combination of resident and intern positions may be expected to exert a strong influence on the demand for, and development of, hospital library services.

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*In order to explore further the clustering of training programs, a probability test was run across all 13 training programs to determine their co-occurrence. Appendix B presents the results of this test. Two interesting comments may be drawn from this test, assuming a probability level of .60. First, there appears to be a group of "basic" training programs which tend to occur together. That is, if a hospital has one of these programs it has at least a .60 probability of having each of the other programs. These programs are nursing, internships, residencies, medical technology, x-ray and practical nursing. These programs may then be seen as the core of a hospital's educational effort. The second observation regards the occurrence of the other seven training programs (the ancillary programs) with this core. It was found that hospitals having any one of these ancillary programs, also have the core programs. Conversely, having one or more of the core programs may not be taken to indicate that a hospital has any of the ancillary programs. It would then appear that training programs do occur in given patterns, and that the effect of the programs upon the medical library can be seen as a function of these patterns.

Specific data with regard to the AMA and AOA approved intern and resident positions were also gathered. Particular attention was given to these training programs since both accrediting associations specify that an approved teaching institution must possess "adequate" library resources.

In the 227 hospitals surveyed, 58 had approved intern programs and 68 had approved resident programs; 53 hospitals had both intern and resident programs. These 126 approved programs offered a total of 2048 training positions.

As may be observed from Table 1, the larger a hospital -- in terms of bed size -- the more likely it is to have an AMA or AOA approved program. In addition, large hospitals have more approved positions than do small hospitals. Table 4, which reports intern positions for the total survey population illustrates this point. (Appendix C provides this data for each sub-population.) These findings in themselves are not surprising in that both the AMA and AOA specify that approved institutions must have well developed patient care programs in order to provide a sufficient range of clinical experience to students. Also, the number of positions assigned to a hospital is largely determined by the size of the hospital.

As a corollary of the above findings it may be observed from Table 5 that the number of resident specialties is greater in the larger hospitals than in the smaller hospitals. This is reasonable in that larger hospitals have a greater number of organized medical services than do smaller hospitals (Tables 11 and 12),

Bed Increments Types	25-175	176-325	Over 326	Total
All Positions	24	207*	700	931
Rotating	24	199	509	732
Straight	0	6	191	197

*Inconsistencies as found in AMA and AOA information.

Table 4

Frequency of Intern Position in the
Total Experimental Population,by Bed Increment

Table 5

Frequency of Resident Positions in the Total Experimental Population, by Bed Increment

Bed Increment Specialty	25-175	176-325	Over 326	Total
All Positions	59	294*	1764*	2117*
General Practice	14	56	60	130
Medicine	3	47	375	425
OBGYN	12	15	141	168
Orthopedics	1	8	68	77
Pathology	0	28	155	183
Radiology	4	7	104	115
Surgery	5	57	305	367
Urology	0	0	37	37
Pediatrics	1	24	51	76
Anesthesia	10	20	96	126
Dermatology	0	0	25	25
Neurosurgery	0	0	17	17
Tuberculosis	0	0	0	0
Ophthmalogy	0	2	49	51
Otology	0	0	99	99
PMR	0	0	42	42
Plastic Surgery	0	0	6	6
Psychiatry	9	24	56	89
Forensic Pathology	0	0	0	0
Neurology	0	0	33	33
Thoracic Surgery	0	0	19	19
Otolaryngology & Othorhinolaryngology	0	2	0	2
Occupational Medicine	0	0	0	0

*Inconsistencies as found in AMA and AOA information

It was also of some interest to investigate the types of specialties which tended to co-occur*, since within our conceptual model this is taken to influence the library function.

Although the precise nature of the demands placed upon hospital libraries by these training programs is difficult to measure, the relationships between the programs and the resources, facilities, services and personnel of the library may be investigated. In investigating this interdependence the subject content of a training program, its content, and the characteristics of its students are of importance. These relationships will be thoroughly investigated during the course of the project. Chapter III presents a preliminary investigation based on certain data presently available.

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*The co-occurrence of residency specialties was obtained through a probability test. Appendix D displays the results of this test. All twenty specialties reported are listed in the columns on the table; those specialties reported by at least nine hospitals are listed in the rows. Assuming a probability level of .60, a situation similar to that occurring with the training programs is found. That is, there appears to be a core of specialties which co-occur with a high degree of regularity. These are medicine, surgery and pathology; radiology may also be added to this group. Once a hospital has this core of programs, it is quite likely to have one of a number of other specialties such as pediatrics or urology. It may be considered that the core programs represent the more "general" programs and complement each other, while the other, more specialized programs, occur only when this base has been developed.

The relationship between training programs and the library may also be taken as the relational model between continuing education courses and the library. The data collected on continuing education courses -- types of programs, subject areas and numbers of persons attending -- was not systematically tabulated because of the wide range of responses received. A rough analysis reveals that 126 of the 227 hospitals offered one or more programs which the hospital classified as continuing education.* The format of these programs included round table discussions, grand rounds, closed-circuit TV and radio programs, tapes and visiting lecturers. Formal courses were offered by the Cleveland Clinic and by Ohio's three operational medical schools.

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*Definition for Continuing Education, as given on the Administrator's Questionnaire was: "courses, lectures, films, slides, closed-circuit TV showings, and other offerings designed to update the knowledge and skills of staff members and/or members of your local community. Do not include educational programs provided as a regular part of internships, residencies or other formally organized programs."

Some fifty of the hospitals offering AMA and AOA approved intern and residency programs also reported organized continuing education programs. It is in these hospitals, according to the library-function model outlined above, that demands on the medical library's services should be greatest and hence it would be expected that these hospitals would have the most elaborate library systems.

In summary:

a) The number and variety of training programs offered by a hospital increases with an increase in the hospital's bed size.

b) Training programs appear in clusters: the 397 training programs tallied were reported by 107 hospitals; and the average hospital had 3.8 programs.

c) Clustering of types of training programs has been determined. Two principal clusters occur; basic programs (nursing, medical technology, x-ray, practical nursing, internships, residencies) and ancillary programs.

d) The larger a hospital's bed size, the more likely it is to have an AMA or AOA intern or resident program. The number of approved positions in the program and the range of residency specialties approved is also a function of hospital size.

e) One hundred and twenty-six of the institutions surveyed reported having hospital-organized continuing education programs for their professional staff. Fifty of these hospitals had AMA or AOA intern and residency programs.

2. Research Functions: Information as to research programs currently in progress in Ohio hospitals was requested on the Administrator's Questionnaire. Each administrator was asked to report:

(i) total number of personnel currently engaged (for more than 50% of their time) in research or research-related activities and the employment classifications of these personnel

(ii) total number of research projects in progress and whether the projects are conducted independently or by the hospital

(iii) subject areas of the research reported

(iv) budgets for the projects

It was anticipated that this information would permit a description of the general research function within the hospital system by means of the identification of certain gross parameters of that function.

A hospital was credited with having a research program if _any_ information was reported in response to the questions asked. On this bases, _some 49 of the 227 Ohio hospitals surveyed had research programs reporting a total of 894 research projects_.

Seventy-eight percent of the projects reported were in general hospitals and 22% in specialty hospitals. Table 6 summarizes the percentage distribution of the total number of reported research projects in the experimental populations, by bed increments. It is obvious from the tables that _among those hospitals reporting research projects, the number of projects reported increased with an increase in hospital bed size_. Within the total experimental population approximately 89% of all projects reported were conducted in hospitals of 325 or more beds. Hospitals of this size represent 1/5 of the hospitals in Ohio. _Research programs, like educational programs, are concentrated in the larger hospitals_. (Appendix E provides this data by smaller bed increments.)

Bed Increment \ Experimental Populations	Total	General Hospitals	Specialty Hospitals
25-175	.8%	.2%	3.0%
176-325	9.7%	3.5%	31.1%
Over 326	89.4%	96.1%	66.3%

Table 6

Percentage Distribution of the Total Number of Reported Research Projects in The Experimental Populations, by Bed Increments

Although this trend holds over all hospitals, there are certain differences between the two sub-populations. Within the general hospital population, 96% of all research projects reported occurred in hospitals of more than 326 beds. For this group it would appear that a general growth in hospital size is accompanied by a diversification in organized medical services (Tables 11 and 12) and in training programs (Table 1) which fosters the development and growth of a research program. In assessing the distribution of research projects in specialty hospitals, a departure from the pattern discussed above should be noted. Although the larger hospitals in this group do display a disproportionate percentage of the total number of research projects (in relation to their proportion in the total population), they do not have as large a share as would be expected. Sixty-six percent of all projects are conducted in hospitals of 326 beds or more, but 31% of the projects are conducted in hospitals having 176-325 beds. This distribution may be attributed to the fact that many large specialty hospitals are state-supported psychiatric institutions and are not research-oriented.

Slightly more than half of the total number of research projects were reported as being conducted by the hospital independently. The data is hence somewhat unreliable, and it appears that the respondents did not understand the question fully. In those cases where the hospital did not indicate whether they conducted a project alone or whether a project was conducted in conjunction with another institution, the hospital was given full credit for the project. Table 7 reports this data for the total experimental population and for each sub-population.

Experimental Population / Research Responsibility	Total	General Hospitals	Specialty Hospitals
Conducted by Hospital alone	57%*	52%	72%
Conducted by Hospital in conjunction with another Institution	43%	48%	28%

*Hospitals were asked to report the total number of research projects breaking them into those conducted by the hospital alone and those conducted in conjunction with another institution. In those cases where this breakdown was not made, all projects reported were considered to be conducted by the hospital alone.

Table 7

Percentage Distribution of the Total Number of Research Projects Conducted by the Hospital Alone and by the Hospital in Conjunction with Another Institution, by Experimental Population

Table 8, summarizes data of the reported areas of hospital-based research by bed increments for the total experimental population. (Appendix F provides the data for each sub-population.) As would be expected, the larger hospitals in Ohio tend to have more diversified research programs than do smaller hospitals; and the general hospitals have more diverse research programs than do the specialty hospitals. Hospitals affiliated with medical schools and their research centers have the largest and most diversified research programs. In total, 30 different areas of research were reported including investigations into hospital administrative problems. An investigation into the co-occurrence of these research areas would be also of interest in determining the relationships between hospital-based research programs and the existence of hospital libraries. It would be expected that a diversified research program will result in a different type of demand on the library than would a less diversified research program.

Data relating to the total numbers of persons currently engaged in research and the budgets involved were not analyzed systematically since these were incomplete and, in many instances, represented only estimates. Of particular interest to the relationship between research programs and the provision of library services is the data gathered with respect to personnel engaged in research. This constitutes an important user population within hospitals. Four categories of persons were identified in this user population:

(i) Researchers (M.D.s and Ph.D.s)

(ii) Research Assistants, including graduate students, nurses, therapists.

(iii) Technicians

(iv) Administrators and clerks.

Bed Increment Areas of Research	25-175	176-325	Over 326	Total
Administration	0	1	4	5
Biomedical Research	1	1	3	5
Cardiovascular System	1	2	12	15
Clinical Pharmacology Pharmacology, Bio-chemistry	0	2	4	6
Connective Tissue Reaction	0	0	2	2
Diabetes	0	0	3	3
Digestive System	0	0	3	3
Endocrinology	0	0	1	1
Genetics & Cytology	0	3	3	6
Geriatrics	0	0	2	2
Hematology & Humoral System	0	2	9	11
Immunology	1	2	3	6
Infectious Diseases	0	0	3	3
Metabolism	0	0	6	6
Muscular Systems	0	0	2	2
Neoplasms, Cancerology	1	1	6	8
Nephrology	0	1	6	7
Neurology	0	1	4	5
Nuclear Medicine	0	0	3	3
Nursing	0	1	2	3
Nutrition	0	1	2	3
Obstetrics & Gynecology	1	0	2	3
Pathology	0	0	2	2
Pediatrics, Developmental Studies	0	1	2	3
Pulmonary System	0	2	5	7
Rehabilitation	1	0	1	2
Rheumatology	0	1	1	2
Surgery	0	1	2	3
Surgery of the Hand	0	0	1	1
Psychiatry and Psychology	1	1	3	5
Other	0	0	1	1

Table 8

Frequency of Reported Areas of Hospital-based Research in the Total Experimental Population, By Bed Increment

More detailed study is needed in this area to refine this classification system and to estimate user needs.

Also of interest is the interaction between research programs and training programs within hospitals. Somewhat less than 75% of hospitals with research programs also have one or more of training programs. Thirty-seven hospitals offering AMA or AOA approved residencies also have research programs. This dual occurrence represents a special type and level of demand on the library and is investigated in Chapter III, Section B-4 in terms of the occurrence of resident specialties and research areas.*

In summary:

a) Twenty-one percent of the 227 surveyed hospitals reported research programs. A total of 894 projects were tallied.

b) The number of projects and subject areas of research reported by a hospital increased directly with the bed size of the hospitals.

c) Within the total experimental population, the general and specialty hospitals differed somewhat in the relationship of research program to bed size and with regard to the number of projects and diversity of programs.

d) Somewhat less than 75% of the hospitals with research programs also have one or more of the training programs tabulated in Section C-1.

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*In order to investigate the co-occurrence of areas of research, a probability test similar to that run on training programs and on residency specialties was performed. Evaluation of the test results was difficult because the number of hospitals reporting work in each research area was so few. Thus although the statistical probabilities were moderately high in many cases, evaluation of the actual significance of the co-occurrence was difficult.

3. Patient Care Functions: In order to describe the patient care function information was gathered in relation to organized medical services, facilities, outpatient clinic departments and personnel of each hospital. Data for the first item was drawn from the Administrator's Questionnaire; the other three items were extracted from the Annual Hospital Registration Report. These data indicate the range and extent of patient care services and facilities which a hospital provides.

In the analysis of data relating to educational and research functions, it was found that a hospital's bed size (except for state institutions) was the single most important factor in determining the size and diversity of programs. Although bed size is an important factor in characterizing the patient care function, the most important factor appears to be the experimental subpopulation to which the hospital belongs.

Thus, although the range of organized medical services, facilities and clinics in the outpatient department increases with bed size in the general sub-population, it does not do so within the specialty sub-population.

Table 9 summarizes the percentage occurrence of given hospital facilities by bed increment for the total experimental population. (Appendix G provides data for each sub-population.) It may be observed from these tables that the range of hospital facilities is much wider in the general subpopulation than in the specialty subpopulation. An increase in this range occurs in the general subpopulation in conjunction with an increase in the number of beds, although such an increase does not occur in the specialty subpopulation.

Bed Increment Facilities	25-125	176-325	Over 326
Anesthesia	67%	93%	89%
Autopsy	54%	95%	91%
Blood Bank	63%	80%	82%
Cancer Registrar	16%	58%	71%
Cardiology Unit	16%	50%	67%
Chapel	50%	85%	87%
Clinical Laboratory	94%	100%	93%
Cobalt Therapy	2%	13%	40%
Delivery Room	70%	78%	78%
Dental	30%	50%	62%
Dietary (w/Dietitian)	87%	100%	91%
Electrocardiology	92%	98%	93%
Electroencephalography	18%	43%	80%
Organized Emergency Dept.	62%	88%	87%
Extended Care	9%	8%	11%
Family Planning	1%	8%	22%
Home Care	5%	3%	13%
Organized Hospital Auxiliary	77%	90%	73%
Intensive Care Unit	12%	60%	73%
Medical Library	87%	100%	93%
Medical Records	96%	100%	93%
Medical Social Service	15%	40%	62%
Occupational Therapy	14%	20%	60%
Operating Room	89%	100%	93%
Organized Outpatient Clinic	23%	60%	87%
Photocopy Laboratory	62%	95%	89%
Pharmacy	62%	100%	89%
Physical Therapy	43%	83%	93%
Post-operative Recovery Room	66%	98%	84%
Premature Nursery	58%	80%	78%
Psychiatric Inpatient	4%	13%	51%
Radioactive Isotopes	23%	70%	80%
Radium Therapy	27%	58%	73%
Rehabilitation	8%	13%	24%
X-ray, diagnostic	95%	95%	93%
X-ray, routine	55%	43%	49%
X-ray, therapeutic	22%	70%	87%

Table 9

Percentage Occurrence of Specific Facilities in
The Total Experimental Population, by Bed Increment

The percentage occurrence of organized clinics in the outpatient departments for the total experimental population is shown in Table 10. (Appendix H provides data for each sub-population). The contrast between the two subpopulations is somewhat greater here than in the case of hospital facilities examined above. Specialty hospitals tend to have many fewer organized clinics in relation to each bed increment than do general hospitals. This may be attributed to the fact that many specialty hospitals within this sample are TB sanitaria or state-supported mental institutions having limited outpatient activities.

The same pattern of differences between general and specialty hospitals found in relation to facilities and clinics exists also in the case of organized medical services. Data on organized medical services within the total experimental population are summarized in Tables 11 and 12. These data were obtained through the Administrator's Questionnaire. Respondents were asked to indicate organized medical services in their hospitals. The 17 services, listed in Table 11, are those specialties covered in the AMA specifications for "Essentials of Approved Internship" and "Essentials for Approved Residencies." Each respondent was also asked to list all other medical services organized within the hospital (Table 12). Although 26 other organized medical services were indicated by the respondents only a few were mentioned by more than several hospitals. The more common of these services are dentistry, physical medicine, cardiology, and thoracic surgery.

Clinics / Bed Increments	25-175	176-325	Over 326
Cancer	3%	20%	51%
Dentistry	2%	10%	42%
Dermatology	1%	23%	53%
EENT	3%	28%	58%
Geriatrics	1%	15%	11%
Gynecology	5%	40%	78%
Internal Medicine	2%	48%	78%
Mental Hygiene	2%	0%	13%
Neurology	4%	15%	44%
Obstetrics	6%	40%	67%
Orthopedics	10%	35%	64%
Pediatrics	4%	38%	51%
Physical Medicine	4%	20%	40%
Psychiatry	1%	8%	31%
Surgery	2%	45%	78%
Tuberculosis	9%	5%	13%
Urology	6%	28%	56%
Well-Child	3%	20%	36%
Deliveries & Complications of Pregnancy	0%	0%	7%
Diseases of the Respiratory System	1%	3%	11%
Diseases of the Digestive System	0%	5%	16%
Injuries from Chemicals	1%	3%	2%
Diseases of the Genito-urinary System	0%	5%	7%
Diseases of the Circulatory System	0%	8%	2%
Neoplasmas	0%	5%	16%
Diseases of the Nervous System	1%	10%	24%
Diseases of Bones & Organs of Movement	1%	0%	24%
Allergenic Diseases	1%	15%	0%
Infective & Parasitic Diseases	0%	3%	0%
Mental Disorders	1%	3%	9%
Connective Tissue Diseases		3%	2%
Congenital Malformations	1%	3%	7%
Pediatric Clinic	1%	5%	0%
Advisory Units	0%	0%	4%
Laboratory	1%	8%	18%

Table 10

Percentage Occurrence of Organized Clinics in
the Outpatient Departments in the Total Experimental Population
by Bed Increment

Bed Increments Service	25-175[1]	176-325[2]	Over 326[3]
Medicine	76%	83%	71%
Internal Medicine	32%	65%	73%
surgery	73%	88%	91%
Pediatrics	42%	70%	71%
Obstetrics	60%	75%	69%
Pathology	59%	77%	84%
Radiology	70%	77%	84%
Anesthesiology	49%	80%	84%
Psychiatry	9%	35%	69%
Neurology	6%	25%	58%
Neurosurgery	7%	35%	53%
Ophthalmology	18%	53%	73%
Otalaryngology	10%	48%	76%
Orthopedics	20%	60%	80%
Gynecology	32%	70%	71%
Contagious Diseases	4%	8%	18%
Urology	16%	65%	71%

Table 11

Percentage Distribution of Organized Medical Services*
In the Total Experimental Population, by Bed Increments

*These medical services were listed by the AMA in "Essentials for an Approved Internships" and "Essentials of Approved Residencies", Directory of Approved Internships and Residencies, 1966.

[1] Represents 142 hospitals
[2] Represents 40 hospitals
[3] Represents 45 hospitals

Table 12

Frequency of Other Organized Medical Services
Reported by the Total Experimental Population, By Bed Increments

Services \ Bed Increments	25-175	176-325	Over 326
General Practice	1	0	3
Outpatient Clinic	1	1	1
Physical Medicine	0	1	5
Rehabilitation	2	0	4
Allergy	0	0	2
Arthritis	2	2	1
Cardiology	0	0	5
Chest Diseases	1	0	2
Dentistry	1	0	7
Dermatology	0	0	4
Endocrinology	0	0	2
Gastroenterology	0	0	2
Geriatrics	1	1	1
Hematology	0	0	1
Hemodialysis	0	0	1
Hypertension	0	0	1
Kidney	0	0	2
Nuclear Medicine	0	0	2
Oncology	0	0	1
Proctology	0	0	1
Tuberculosis	4	0	0
Venereal Diseases	0	0	0
Oral Surgery	0	1	1
Plastic Surgery	0	1	3
Thoracic Surgery	0	3	3
Vascular Surgery	0	2	2

The personnel factor was of considerable interest in this project in terms of the numbers, kinds and occupations of personnel which a medical library would have to serve. Unfortunately, the data available through the Annual Hospital Registration Form proved, in analysis, to be incomplete and inconsistent, making it unfeasible to explore this factor in detail. (For example, most hospitals did not differentiate between full and part-time personnel, and the total number of personnel reported was often less than the total obtained by summing the different personnel categories. In addition, sufficient information relating to specific job tasks and to educational level were not available.) This area, however, warrants further investigation, especially in relationship to establishment of Regional Medical Library Programs. (Appendix I provides a summary of hospital-employed manpower in Ohio.)

To summarize:

(a) The most important factor in determining the diversity of a hospital's patient care function is the sub-population to which the hospital belongs.

(b) Within the general hospital sub-population, an increase in bed size leads to a corresponding increase in the patient care program.

(c) Specialty hospitals tend to have many fewer organized medical services, facilities and clinics in the outpatient department.

(d) Approximately 65% of all personnel reported by Ohio hospitals are involved either in direct patient care or in nursing education.

(e) The variety and level of demands made upon the hospital library may be investigated through an analysis of this user population (d).

D. Profile by Hospital Bed Increment

In the previous section, basic data relating to each hospital function hypothesized to be of primary relevance to the medical library was presented. Actual and potential interactions among hospital functions, and between each function and the medical library were discussed in terms of their implications for the organization and delivery of library services. The two factors found to be most important in projecting the diversity of each of the functions within any given hospital were (i) bed size and (ii) whether the hospital was a general or a specialty hospital.

In this section, the same data will be "turned on its side," and summarized from the viewpoint of each of the three bed increments. The sub-population distinction used previously will be dropped.* The objective of this section is to create profiles of the hospitals within each of the three bed increments in relation to the patient care, research and training functions. The interaction among the functions and between the functions and the library will become more readily apparent for each bed increment. A summarization of these profiles is presented in Table 13 and includes somewhat more detail than the textual profiles below.

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*The subpopulation distinction was dropped because the number of specialty hospitals was so small, and because the general-specialty hospital factor only becomes significant in terms of the patient care function. Therefore, qualifications to each profile will have to be made if the hospital in question is a specialty hospital.

Table 13

Profiles of Hospital Bed Increments by Functions

Bed Increments Functions	25-175 (142 hospitals)	176-325 (40 hospitals)	Over 326 (45 hospitals)
I. Educational Functions			
A. Percentage of hospitals offering training programs	25%	88%	80%
B. Number of Programs	55	112	230
C. Percentage of All programs offered occurring in each bed increment	14%	28%	57%
D. Training Programs per hospital	.38	2.8	5.1
E. Types of Training programs offered	Nursing Intern Residency Medical Technology Hospital Administration Hospital Pharmacy X-ray Practical Nursing	Nursing Intern Resident Cytotechnology Dietetics Inhalation Therapy Medical Technology Hospital Administration Nurse Anesthetic Hospital Pharmacy X-ray Practical Nursing	Nursing Intern Resident Cytotechnology Dietetics Inhalation Therapy Medical Records Medical Technology Hospital Administration Nurse Anesthetics Hospital Pharmacy X-ray Practical Nursing

Cont. of Table 13

Functions \ Bed Increments	25-175 (142 hospitals)	176-325 (40 hospitals)	Over 326 (45 hospitals)
F. Number of hospitals in each bed increment having AMA/AOA approved:			
1. Internships	6	17	35
2. Residencies	11	19	37
G. Continuing Education (No Formal Analysis)			
II. Research Function			
A. Percentage of hospitals having research programs	5%	30%	67%
B. Total number of individual projects	7	87	799
C. Percentage of all projects occurring in each bed increment	.8%	9.7%	89.4%
D. Number of Research areas reported (For a comparison of specific areas of research reported see Table 15, 16, and 17)	7	17	30

Cont. of Table 13

Functions / Bed Increments	25-175 (142 hospitals)	176-325 (40 hospitals)	Over 326 (45 hospitals)
E. Number of hospitals having training programs and research programs	1	9	25
F. Number of hospitals having AMA/AOA interns and/or residencies and research programs	1	9	25
III. Patient Care Function			
A. Percentage of all hospital personnel employed in each bed increment	25%	25%	25%
B. Percentage of all beds in each increment	29%	23%	48%
C. Organized medical services reported by 50% or more of the hospitals in each bed increment	Medical Surgery Obstetrics Pathology Radiology Anesthesiology	Medicine Internal Medicine Surgery Pediatrics Obstetrics Pathology Radiology	Medicine Internal Medicine Surgery Pediatrics Obstetrics Pathology Radiology

Cont. of Table 13

Bed Increments / Functions	25-175 (142 hospitals)	176-325 (40 hospitals)	Over 326 (45 hospitals)
D. Organized clinics in the outpatient departments reported by 50% or more of the hospitals in each bed increment	None	Anesthesiology Ophthalmology Orthopedics Gynecology Urology None	Anesthesiology Psychiatry Neurology Neurosurgery Ophthalmology Otalaryngology Orthopedics Gynecology Urology Cancer Dermatology EENT Gynecology Internal Medicine Obstetrics Orthopedics Pediatrics Surgery Urology

Cont. of Table 13

Bed Increments / Functions	25-175 (142 hospitals)	176-325 (40 hospitals)	Over 326 (45 hospitals)
E. Number of Facilities reported on the Annual Hospital Registration Report by 50% or more of the hospitals in each bed increment. (For a comparison of specific facilities, See Tables 18 and 19.)	19 of 36	27 of 36	32 of 36

1. 25-175 Bed Increment: This increment consists of 142 hospitals (117 general hospitals and 25 specialty hospitals.) Although some of these hospitals are in the state's metropolitan areas, most of the hospitals are outside of these areas.

Twenty-five percent of the hospitals within this increment offer training programs. This represents 55 separate programs or 14% of the total number of training programs offered in the State. The programs are Internships and Residencies, Nursing, Medical Technology, Hospital Administration, Hospital Pharmacy, X-ray and Pracital Nursing. Six of the 142 hospitals have AMA or AOA approved internships representing 24 positions (rotating), and 11 have residency programs representing 59 positions. The residency specialties represented are general practice, medicine, obstetrics, orthopedics, radiology, surgery, pediatrics, anesthesia, and psychiatry.

Five percent of the hospitals report conducting a total of 7 research programs. Seven subject areas of research are reported: biomedical, cardiovascular, immunology, neoplasms, obstetrics-gynecology, rehabilitation and psychiatry. Most of these research programs are small both in terms of budget and personnel. Only one hospital in this increment is identified as having both a research and training program.

Specialties within the patient care function are less differentiated in hospitals of this size than in the larger bed increments. Fifty percent or more of the hospitals report organized medical services in medicine, surgery, obstetrics, pathology, radiology, and anesthesiology. Organized clinics in the outpatient departments were reported by only a few of the hospitals; only 19 of the 36 hospital facilities tabulated were reported by more than 50% of the hospitals.

Hospitals in this bed increment employ 25% of the total number of persons employed in hospital health care. This increment accounts for 29% of the total number of hospital beds in the state.

2. 176-375 Bed Increment: This increment consists of 40 hospitals (35 general hospitals and five specialty hospitals), and for 23% of all beds in the State. A number of these hospitals are located in the major metropolitan areas; two of the specialty hospitals are affiliated with medical schools and have well-developed training and research programs.

Eighty-eight of the hospitals within this environment offer one or more training programs. There exists a total of 112 programs, or 2.8 programs in each reporting hospital. Training programs are reported in nursing, internship and residencies, cytotechnology, dietetics, inhalation therapy, medical technology, hospital administration, nurse anesthetic, hospital pharmacy, x-ray and practical nursing. Seventeen internship programs with some 207 training positions and 19 resident programs with some 294 training positions were reported. Residency specialties in these hospitals are offered in general practice, medicine, obstetrics-gynecology, orthopedics, pathology, radiology, surgery, pediatrics, anesthesia, ophthalmology, psychiatry and otolaryngology. Twenty-eight percent of all training programs offered within the state occur in these 40 hospitals.

Research programs are reported by 30% of the hospitals. Eighty-seven individual projects in 17 subject areas, representing 9.7% of all projects in the state, were tallied from these hospitals. The subject areas of research are: administration, biomedical, cardiovascular, clinical pharmacology, genetics, cytology, hematology and humoral system, immunology, neoplasms, nephrology, neurology, nursing, nutrition, pediatrics, pulmonary system, rheumatology, surgery, and psychiatry.

An interaction between training programs and research programs may be seen in this increment. Six of the hospitals report research in the same or very closely related areas as their residency specialties, and the research areas reported by the other hospitals may be seen to be related to their residency specialties. This close relationship between research and training must be taken into account in the design and implementation of library services.

Twelve of the 17 organized medical services identified through the Administrator's Questionnaire may be found in 50% or more of the hospitals within this bed increment. They are medicine, internal medicine, surgery, pediatrics, obstetrics, pathology, radiology, anesthesiology, ophthalmology, orthopedics, gynecology, and urology.

Twenty-seven of the 36 hospital facilities tabulated are found in 50% or more of these hospitals, and organized clinics of one sort or another are to be found in 25% or more hospitals. Table 25 enumerates these facilities and services. Twenty-five percent of all hospital health care personnel are employed in these 40 hospitals.

3. 326 - Plus Bed Increment: Forty-five hospitals were identified in this group. Almost all of these hospitals are located in metropolitan areas with the exception of several state-supported mental institutions. Many of these hospitals are affiliated with medical schools, and almost all have well-developed training and research programs. Thirty-seven of these 45 hospitals are general hospitals, eight are specialty. This group accounts for 48% of all beds in the state, and approximately 50% of all hospital employees.

Fifty-seven percent (230) of the training programs in the state of Ohio are offered in these hospitals. Eighty percent of all hospitals in this increment offer training programs. Training programs are nursing, internships and residencies, cytotechnology, dietetics, inhalation therapy, medical records, medical technology, hospital administration, nurse anesthetic, hospital pharmacy, x-ray and practical nursing. Internships are offered in 35 hospitals (approximately 700 training positions) and residencies are offered in 37 hospitals (approximately 1,764 training positions). Nineteen residency specialties are offered. These are enumerated in Table 9 with an indication of the number of positions in each specialty.

The research programs in these hospitals are large and diversified. Sixty-seven percent of the hospitals in this increment have research programs and report 799 individual research projects reported in all increments. Thirty areas of research were reported; Table 15 lists these areas and gives the number of individual projects within each area. A close relationship between training and research also exists within the hospitals in this increment.

F. Profile of the Ohio Hospital System

Previous sections have been devoted to a characterization of hospitals in terms of three functions (patient care, education and research) and of bed size in terms of three increments. The objective of these characterizations has been to describe each of the functions, their interactions and their occurrence within Ohio hospitals of various bed increments, in order to provide the context for the subsequent analysis of libraries within these hospitals. The characterization of each function, and of their interaction within hospitals of several sizes, furnishes the necessary data for defining with some precision the demands for library service. Programs of patient care, education and research can be seen to exist independently and also to co-occur in certain patterns, and the patterns of these occurrences determines to a large extent the actual and potential requirements for library service in support of these functions. Chapter III will provide the complement to this analysis of hospitals by characterizing hospital libraries on the basis of certain information and by indicating the existing pattern of co-occurrence of the hospital functions and the libraries.

1. Distribution of Hospitals and Beds in the State: Hospitals in Ohio tend to be concentrated in metropolitan areas, and this pattern of concentration is especially true of the larger hospitals. Nearly 50% of all hospital beds are to be found in hospitals having more than 326 beds. A detailed analysis of this distribution and figures showing the actual distribution of hospitals in Ohio are to be found in a previous report of this research project.*

From these findings it is evident that hospitals are oriented toward the urban population of Ohio, offering a wide range of services to this population. Rural populations tend to be served by smaller hospitals which offer considerably fewer specialized services. A number of rural hospitals are county-operated and may be viewed as providing a necessary set of generalized services to an immediate population. On the other hand, hospitals in urban districts serve an immediate population as well as supplementing the services of rural hospitals. It is expected that regionalization of hospital services will tend to emphasize this urban-specialty/rural-generalized dichotomy and to facilitate the transfer of patients and of emergency services. Any regional planning of library services should follow the existing and projected regional planning of hospital services.

2. Division-of-Labor Among Ohio Hospitals: It is not possible to create a "typical" Ohio hospital since a wide range of sizes, services and orientations are exhibited across the 227 hospitals in the survey population. It is possible, however, to consider the occurrence and co-occurrence of hospital functions in order to perceive how specific functions are accomplished in the Ohio health care system.

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*Interim Report No. 1.

It seems evident that almost all Ohio hospitals see patient care as their primary, if not only, function. Within the 227 hospitals surveyed, 79% did not report research programs and 53% reported having no training programs. Hospitals which did report research and training programs tended to be located in the metropolitan areas with many being affiliated with a medical school.

From the perspective of the limited survey conducted by this project it appears that a division of labor occurs among Ohio hospitals. All hospitals are of course, engaged in patient care functions, However, for most smaller hospitals (25-175 beds) this is the only formally organized function. Educational programs tend to be limited to in-service or on-the-job training, and research is not recognized within the hospital's formal structure. Educational programs and research programs are usually found in large hospitals, with the extent of the program directly related to the bed size of the hospital. Educational and research programs do co-occur in the same hospitals; 75% of the hospitals reporting research programs also report training programs. These hospitals are usually located in the metropolitan areas and are affiliated with universities through cooperative teaching and/or research projects.

Regional programs may be expected both to use and to accentuate this division of labor in optimizing the delivery of health care services. Regional planning and implementation of library services will certainly have to accord recognition to these factors and to provide information resources and services appropriate to the several types of hospitals as differentiated by function and bed size.

III. THE OCCURRENCE OF MEDICAL LIBRARIES WITHIN OHIO HOSPITALS

The central issue to be explored in this chapter relates to the frequency of occurrence of medical libraries within the survey population of Ohio hospitals. Two other issues will be explored in some detail: the co-occurrence of hospital libraries and particular hospital functions; and the possibility of predicting the existence and level of operation of a hospital's medical library from information regarding the functions of patient care, research and education. The design of the research project is based upon the fundamental assumptions that the hospital library located within the hospital environment is or ought to be engaged in a series of interactions with each of the primary hospital functions, taken separately and in combination, and that the resources, facilities, services, and personnel of the library should be observed and evaluated within this series of relationships. These relationships will be explored again in much greater depth when information regarding the actual budgets, user populations, usage patterns, facilities, resources, personnel, etc., of the libraries surveyed has been codified and prepared for analysis.

The analysis and results discussed below were based on information extracted from the Ohio Annual Hospital Registration Report and from a questionnaire directed to Administrators of all Ohio hospitals. The data extracted permitted the establishment of a set of criteria which were used to determine whether or not a hospital possessed a library. Any hospital meeting at least one of these requirements was regarded as having a medical library, and a hospital was kept in the sample until information could be obtained showing that it did not possess a library.* The four criteria were defined as:

a) hospital claims to have a medical library,

b) hospital is accredited by the Joint Commission on Hospital Accreditation (the Joint Commission requires that a hospital have a medical library "adequate" to its needs).

c) hospital reports a budget, or at least a book fund for the library.

d) hospital reports personnel in the library.

No weighting was assigned to any one of these criteria, and hospital medical libraries were described as meeting a number of the total criteria rather than as meeting any of the criteria in particular. For example, a library could meet any three criteria or any two or any one criteria of the total set of criteria.

One of the criteria was separated out, however, as being of particulr importance to this project, and the survey population was divided into two groups on the bases of this criterion. The criterion was (d): hospital reports personnel in the library. Data with reference to this criterion was gathered as a result of a question in the Administrator's Questionnaire regarding the "name and title of the person in charge of the library." Essentially two classes of responses were received: (i) those which indicated that the named persons actually performed library tasks for some percentage of their time, and (ii) those which indicated that the named person was responsible for the library as a "caretaker" but probably did not perform any library tasks, e.g., the Administrator, Chairman of the Library Committee, Director of Medical Education, Director of Nursing, etc. The latter set of libraries were presumed to be caretaker-type establishments, and this assessment has been confirmed by subsequent information gathered regarding library services, resources, etc. On the bases of these data, two sub-sets of libraries were established:

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*Some initial assessments regarding the existence of libraries in hospitals have been revised on the basis of additional information gained through a direct questionnaire to the person cited by the Administrator as "in charge of the library." In this manner, seven hospitals were dropped from the sample leaving a survey population of 220.

(i) _functional libraries_: defined as libraries reporting personnel actually performing library tasks, and

(ii) _non-functional libraries_: defined as libraries reporting administrative personnel as being in charge of the library.

This functional - non-functional dichotomy along with the two experimental populations (defined in Chapter II) results in four sub-populations within the total survey population:

	Functional Libraries	Non-Functional Libraries
General Sub-population	129 (67%) Hospitals	63 (33%) Hospitals
Specialty Sub-population	25 (72%) Hospitals	10 (28%) Hospitals

Dichotomy of Functional/Non-Functional Hospital Libraries

A. Occurrence of Medical Libraries Within the Survey Population

Of the 297 hospitals initially identified within Ohio, 227 are presently accepted within the survey population. Each of these hospitals meets at least one of the four criteria pertaining to the existence of a library and in addition (i) was an independent institution, (ii) had responded to the Administrator's Questionnaire, and (iii) had responded to the Ohio Annual Hospital Registration Report. Thus, the in-depth analysis of the survey data will cover approximately 76% of the hospitals in the State. Only one subset of hospitals--the state-supported mental institutions--are under-represented in the survey population. This is due to the fact that the type of data obtained from the Annual Hospital Registration Form was not available through the Ohio Department of Mental Hygiene and Correction, Bureau of Hospitals.

When the 227 hospitals possessing libraries are considered with reference to the four library criteria enumerated above, it is clear that the number of criteria which a library meets increases linearly with an increase in the hospital's bed size. This is evident in Table 14. If the number of criteria met by a hospital library is assumed to be indicative of the library's level of development, then it may be observed that the level of development of a library increases linearly with an increase in bed size. Bed Size appears to be the crucial variable in determining the scope of a hospital's patient care, research and education functions. The percentage distribution of hospitals in each bed increment meeting one, two, three and four of the library criteria is shown in Table 15. It is evident that hospitals in the "176-325" and "over 326" bed increments tend to "pile-up" in the four criteria cell, while hospitals

Bed Increments	Average No. of Criteria Met
25 - 175	2.85
176 - 325	3.34
Over 326	3.66

TABLE 14

AVERAGE NUMBER OF CRITERIA MET BY HOSPITALS IN EACH BED INCREMENT

No. of Criteria Met Bed Increments	1	2	3	4
25 - 175	8%	25%	38%	28%
176 - 325	5%	6%	36%	52%
Over 326	--	12%	9%	78%

TABLE 15

PERCENTAGE DISTRIBUTION OF HOSPITALS IN THE SURVEY POPULATION MEETING 1, 2, 3 and 4 LIBRARY CRITERIA, BY BED INCREMENT in the "25-175" bed increment are more evenly distributed across all four cells. This tends to confirm the linear correlation between bed size and number of criteria met.

Bed size also emerges as a primary variable in relation to the functional/non-functional library dichotomy. Of the 227 hospitals in the survey population, 154 or 67% of the hospitals have been designated as having functional libraries (personnel are reported who perform library tasks). Thirty-three percent of the hospitals have non-functional libraries. These non-functional libraries will also be referred to as "caretaker libraries." That is, the persons (administrators, Directors of Medical Education, etc.) who are responsible for them occupy administrative positions only and do not perform library tasks.

Table 16 summarizes the breakdown of functional and non-functional libraries in percentages by bed increment; the actual number of hospitals in each category appears in parentheses. Within each bed increment, a larger percentage of the hospitals fall in the functional than in the non-functional category. Also it may be observed that the percentage of libraries designated as "functional" increases from bed increment to bed increment. In the 25-175 bed increment just over half of the libraries are designated as functional; in the 176-325 increment almost three-quarters are functional; and in the 326 plus bed increment, 94% are designated as functional libraries. The percentage distribution of hospitals in the functional and non-functional categories meeting 1, 2, 3 and 4 criteria by bed increments are summarized in Table 17 and 17a. These are of interest when compared with Table 15, which presents similar data for the total survey population. Statistically significant differences were found among these tables (x=.05). In summary, it may be concluded that:

Classification / Bed Increment	Functional	Non-Functional	Total
25 - 175	56% (74)*	44% (58)	100% (132)
176 - 325	73% (30)	27% (11)	100% (41)
Over 326	94% (44)	6% (3)	100% (47)
TOTAL	67% (148)	33% (72)	100% (220)

* Actual number of hospitals in each class.

TABLE 16

PERCENTAGE DISTRIBUTION OF FUNCTIONAL AND NON-FUNCTIONAL LIBRARIES, by BED INCREMENTS

No. of Criteria Met / Bed Increment	1	2	3	4
25-175	4%	18%	41%	31%
176-325	7%	7%	33%	54%
Over 326	--	9%	9%	82%

TABLE 17

PERCENTAGE DISTRIBUTION OF FUNCTIONAL HOSPITALS MEETING 1,2,3 and 4 LIBRARY CRITERIA, BY BED INCREMENT

No. of Criteria Met / Bed Increment	1	2	3	4
25-175	14%	28%	34%	24%
176-325	--	10%	45%	45%
Over 326	--	67%	--	33%

TABLE 17 a.

PERCENTAGE DISTRIBUTION OF NON-FUNCTIONAL HOSPITALS MEETING 1,2,3 and 4 LIBRARY CRITERIA, By BED INCREMENT

1. Medical libraries, as defined in this study, occur in approximately 76% of the hospitals in Ohio.

2. Of the 227 Medical libraries in the study, 67% are classified as functional (i.e., personnel are reported who perform library tasks) and 33% are classified as non-functional (i.e., reported personnel fill caretaker positions only).

3. The number of criteria (level of development) which a hospital library meets may be seen as a function of the hospital's bed size.

B. Occurrence of Medical Libraries in Relation to Major Hospital Functions

1. Patient Care Functions: A hospital's patient care function, for present purposes, will be defined to be its experimental population since that variable, together with bed size, was seen to be the most important factor in predicting a hospital's range of facilities, services and organized medical services. (Chapter II; Section D-3)

Eighty-five percent of the hospitals in the total survey population are general hospitals; 15% are specialty hospitals. The functional-non-functional classification may be seen to divide these two subpopulations as follows:

	Functional Libraries	Non-Functional Libraries
General Sub-population (85%)	129 (67%) Hospitals	63 (33%) Hospitals
Specialty Sub-population (15%)	25 (70%) Hospitals	10 (30%) Hospitals

With reference to this figure it may be observed that the incidence of occurrence or non-occurrence of a functional library appears to be approximately the same within the two experimental sub-populations Approximately 2/3 of the hospitals in each sub-population have "functional" libraries.

The similarity in the libraries in the two sub-populations is further illustrated by Tables 18 and 18a which present the percentages of hospitals within each bed increment which meet 1, 2, 3, and 4 library criteria respectively. Table 18 presents the data for the general sub-population; Table 18a for the specialty sub-population. When a Kalmogorov-Smirnov Two Sample Test was performed to determine whether significant differences appeared between these two sub-populations, by bed increment, negative results were obtained at the .05 level. It may be concluded that general or specialty-oriented patient care programs do not significantly effect the occurrence of functional libraries or the level of library development.

In summary, it may be concluded that if the patient care function is equated to sub-population identity, then it effects significantly neither the occurrence of functional libraries within hospitals nor the level of library development. That is, specialty hospitals are as likely to have functional libraries as are general hospitals.

2. Research Functions: For purposes of the present analysis, a hospital was credited with a research program if it reported any information regarding personnel, budget, number of projects, or areas of research. Forty-seven of the 227 hospitals in the total survey population were identified as having research programs within this definition. Of this total thirty-seven were general hospitals; ten were specialty hospitals.

No. of Criteria Met / Bed Increment	1	2	3	4
25-175	10%	26%	36%	28%
176-325	3%	6%	39%	52%
Over 326	--	13%	10%	77%

TABLE 18

PERCENTAGE DISTRIBUTION OF HOSPITALS IN THE GENERAL SUB-POPULATION MEETING 1,2,3 and 4, LIBRARY CRITERIA, BY BED INCREMENT

No. of Criteria Met / Bed Increment	1	2	3	4
25-175	5%	25%	45%	25%
176-325	20%	20%	20%	40%
Over 326	--	14%	--	85%

TABLE 18 a.

PERCENTAGE DISTRIBUTION OF HOSPITALS IN THE SPECIALTY SUB-POPULATION MEETING 1,2,3, and 4, LIBRARY CRITERIA, BY BED INCREMENT

When hospitals with research programs are compared with the total survey population, they are found to be more likely to have functional libraries. Sixty-seven percent of the hospitals in the total survey population have functional libraries; 94% of the hospitals with research programs have functional libraries.

	Functional	Non-functional
Hospitals with Research Programs	44 (94%)	3 (6%)
Hospitals Without Research Programs	31 (17%)	149 (83%)

In addition, the average hospital with a research program meets more of the library criteria than does the average hospital in the total survey population. Hospitals with research programs meet, on the average, 3.59 of the library criteria while the average figure for the survey population is approximately 3.11

Table 19 presents the percentage distribution of hospitals with research programs meeting one, two, three and four of the library criteria, by bed increment. Certain differences may be seen when this table is compared with Table 15, which presents similar data for the total survey population. In order to determine whether or not these differences were significant, a Kolmogrov-Smirnov Test Sample Test was performed by bed increments. However, the N's for the research population were too small to achieve valid results. When the test was performed comparing the two groups without regard to bed increments the results were significant.

No. of Criteria Met / Bed Increment	1	2	3	4
25 - 175	--	28%	58%	14%
176 - 325	--	9%	18%	73%
Over 326	--	18%	11%	81%

TABLE 19

PERCENTAGE DISTRIBUTION OF HOSPITALS WITH RESEARCH PROGRAMS MEETING 1,2,3 and 4 LIBRARY CRITERIA, BY BED INCREMENT

In conclusion, research programs have been observed to be closely associated with the frequency of occurrence of functional libraries in hospitals and with the number of criteria which these libraries meet. Approximately 2/3 of the hospitals in the survey population have functional libraries, yet almost all (94%) hospitals with research programs have functional libraries. This finding was expected in view of the assumption which underlies this project that specified hospital functions and the medical library interest.

3. Educational Functions: Two distinct aspects of a hospital's educational function were identified: training programs and continuing education programs. The level of statistical data obtained warranted detailed analysis only for the training programs. For the purpose of this study two problems have been investigated: (i) the relationship between the total number of training programs and the medical library, and (ii) the relationship between AMA/AOA intern and resident programs and the medical library.

(i) Training Programs:

Within the total survey population, 107 hospitals were identified as offering one or more training programs, and the average number of training programs offered by those hospitals was 3.8. Ninty-nine of the total are general hospitals and eight are specialty hospitals.

Hospitals with training programs were found to be more likely to have functional libraries than were hospitals in the total survey population. Almost 80% of the hospitals with training programs had functional libraries, compared with only 67% of the hospitals in the total survey population. The figure below summarizes the comparison between hospitals with training programs, hospitals without training programs, and the total survey population with reference to the functional/non-functional dichotomy.

	Functional	Non-Functional
Hospitals With Training Programs	86 (80%) hospitals	21 (20%) hospitals
Hospitals Without Training Programs	68 (57%) hospitals	52 (43%) hospitals
Total Survey Population of Hospitals	154 (67%) hospitals	73 (33%) hospitals

The average medical library located within hospitals with training programs met approximately 3.46 of the library criteria. This is somewhat higher than the average for the total survey population (3.11), but lower than for hospitals reporting research programs (3.59). The data appear, therefore, to support the assumption posited earlier that the requirements of training programs would influence the level of development of a hospital's library.

In order to establish whether or not the difference in the number of criteria met by hospitals with training programs and by hospitals within the total survey population was statistically significant, a Kalmogorov-Smirnov Two Sample Test was performed comparing the two populations by bed increment. Of the three bed increments, only the "175-325" increment proved to be significant at =.05 level. A test was then performed which compared the two samples across all bed increments, and the results were significant. It was concluded that training programs within a hospital significantly effect the medical library, in terms of the number of criteria -- and hence the level of development -- which the library attains. The distribution of hospitals (in percentages) within each bed increment in relation to the number of criteria met is summarized in Table 20.

No. of Criteria Met Bed Increment	1	2	3	4
25-175	3%	15%	47%	35%
176-325	--	9%	28%	63%
Over 326	--	11%	9%	80%

TABLE 20

PERCENTAGE DISTRIBUTION OF HOSPITALS WITH TRAINING PROGRAMS MEETING 1,2,3, and 4 LIBRARY CRITERIA, BY BED INCREMENT

In Summary: training programs can be observed to influence the frequency of occurrence of functional libraries in hospitals and to affect significantly the number of criteria which these libraries meet.

(ii) AMA/AOA Programs:

Seventy-three hospitals within the survey population were identified as having AMA/AOA intern and/or resident programs. Some 58 of these programs are internships, and 68 are residencies. Eight of the hospitals are specialty hospitals, and 65 are general hospitals.

As with the training and research programs discussed above, the occurrence of AMA/AOA accredited training programs in hospitals tends to increase the frequency of occurrence of functional libraries and to upgrade the level of development of these libraries when compared with libraries in the total survey population.

This increased frequency may be measured in several ways. First, 88% of the hospitals with AMA/AOA programs have functional libraries as opposed to 67% in the total survey population. Second, hospital libraries within this group met 3.71 of the library criteria per hospital while hospitals in the total survey population meet only 3.11. Third, a significant difference was found (x=.05) in the number of criteria met by hospitals with AMA/AOA programs and by hospitals in the total survey population when the two were compared without regard to bed increments. When the bed increments were tested for significance separately, only the "175-325" increment was found to be significant. Table 21 presents the hospitals by bed increments

No. of Criteria Met / Bed Increment	1	2	3	4
25-175	9%	9%	64%	18%
176-325	--	5%	22%	73%
Over 326	--	13%	10%	77%

TABLE 21

PERCENTAGE DISTRIBUTION OF HOSPITALS WITH AMA/AOA PROGRAMS MEETING 1,2,3 and 4 LIBRARY CRITERIA, BY BED INCREMENT meeting 1, 2, 3 and 4 library criteria. A comparison of this table with Table 15 shows the increased tendency of hospitals with AMA/AOA programs to fall in the higher criteria cells.

In summary: AMA/AOA programs affect the frequency of occurrence of functional libraries in their host hospitals and significantly influence the number of criteria which these libraries meet.

4. Co-occurrence of Research and Training Functions:

It was also of interest to establish the functional/non-functional status of those libraries occurring in hospitals having both training and research programs. Thirty-seven hospitals were identified as having both types of programs; five of these were specialty hospitals and 32 were general hospitals.

Functional libraries occurred in 36 (97%) of the 37 hospitals with training and research programs, and the average number of criteria met by each of these hospitals was 3.71. In comparison, only 67% of the hospitals in the survey population had functional libraries, and the 3.71 criteria/hospital found in this population compares to a 3.11 criteria/hospital for the total survey population. The co-occurrence of these two programs within a hospital correlates highly with the existence of a functional library.

A population consisting of hospitals reporting AMA/AOA programs and research programs was then identified. Thirty-five hospitals met these requirements, and all were found to have functional libraries. It was not surprising to find that all of these hospitals had functional libraries in view of the assumptions posited earlier concerning the interaction between hospital functions and the library.

In summary: Table 22 summarizes the most important statistical findings presented concerning the occurrence of functional libraries and the level of hospital library development in relation to each hospital function. Several observations may be drawn from this table. Approximately 1/3 of the hospitals within Ohio do not have functional library facilities on the premises. Furthermore, nearly 20% of the hospitals offering some formally organized training programs do not have functional libraries, and 12% of the hospitals with AMA/AOA approved programs do not have functional libraries although both organizations require libraries "adequate" to the needs of the program. Research activities appear to exert the strongest influence on the library: 94% of the hospitals with research activities have functional libraries; and hospitals having both research and training programs tend to almost always have functional libraries.

The measurement provided by the number of criteria met per hospital is of somewhat less interest in view of the tentative nature of the criteria. A more sophisticated description of libraries vis-a-vis each hospital function will be attempted in a forthcoming report using data from the Medical Library Questionnaire which was completed by each functional library.

Population (based on function)	Percentage of Functional Libraries	Number of Criteria/ Hospital
Total Survey Population	67%	3.11
Hospitals with Research Programs	94%	3.59
Hospitals with Training Programs	80%	3.46
Hospitals with AMA/AOA Training Programs	88%	3.71
Hospitals with Research and AMA/AOA Training Programs	100%	3.65

TABLE 22

STATISTICAL SUMMARY OF THE CO-OCCURRENCE OF MEDICAL LIBRARIES WITH HOSPITAL FUNCTIONS

C. Predictive Model for Functional Libraries

An attempt was made to formulate a model to predict whether or not a library would be functional dependent upon the occurrence and co-occurrence of the hospital functions: patient care, research and education. The attempt was unsuccessful due, it is felt, to the fact that most of the data was non-serial. That is, a hospital was credited either with having a research program or with not having one, and discriminations regarding the size of the program was not incorporated. It is intended, however, to continue work on this predictive model using serial data to describe the functions and information from the Medical Library Questionnaire. Such a model is of some interest in attempting to establish standards for hospital administrators to use in funding their library facilities.

Programs \ Bed Increment	25-175[2]	176-325[3]	Over 326[4]	Total
Nursing	4	17	32	53
Intern	3	14	32	49
Resident	6	14	32	52
Cytotechnology	0	2	7	9
Dietetics	0	1	6	7
Inhalation Therapy	0	1	4	5
Medical Records	0	0	2	2
Medical Technology	8	8	27	43
Hospital Administration	1	3	9	13
Nurse Anesthetics	1	1	2	4
Hospital Pharmacy	1	4	7	12
X-ray	11	15	28	54
Practical Nursing	16	20	25	61

[1] Includes 192 hospitals
[2] Includes 121 hospitals
[3] Includes 35 hospitals
[4] Includes 36 hospitals

Table A-1

Frequency of Various Training Programs
in the Sub-population of General Hospitals[1], by Bed Increment

Bed Increments Programs	25-175[2]	176-325[3]	Over 326[4]	Total
Nursing	1	1	2	4
Intern	0	2	2	4
Resident	3	3	3	9
Cytotechnology	0	0	0	0
Dietetics	0	0	2	2
Inhalation Therapy	0	0	1	1
Medical Records	0	0	1	1
Medical Technology	0	2	1	3
Hospital Administration	0	0	1	1
Nurse Anesthetics	0	0	0	0
Hospital Pharmacy	0	0	0	0
X-ray	1	2	1	4
Practical Nursing	0	2	2	4

[1] Includes 35 hospitals
[2] Includes 21 hospitals
[3] Includes 5 hospitals
[4] Includes 9 hospitals

Table A-2

Frequency of Various Training Programs in the Sub-population of Specialty Hospitals[1], by Bed Increment

Columns / Rows	Nursing	Intern	Resident	Cytotechnology	Dietetics	Inhalation Therapy	Medical Records	Medical Technology	Hospital Administration	Nurse Anesthetic	Hospital Pharmacy	X-ray	Practical Nursing
Nursing	--	.75	.71	.13	.13	.11	.05	.61	.23	.05	.20	.68	.63
Intern	.79	--	.89	.17	.17	.09	.06	.64	.21	.06	.21	.70	.72
Resident	.67	.78	--	.15	.15	.07	.05	.53	.18	.05	.15	.60	.63
Cytotechnology	.78	1.0	1.0	--	.33	.11	.00	.67	.33	.22	.33	.89	.56
Dietetics	.78	1.0	1.0	.33	--	.11	.11	.67	.44	.11	.22	.78	.67
Medical Technology	.74	.74	.70	.13	.13	.09	.04	--	.20	.04	.15	.85	.67
Hospital Administration	.93	.79	.79	.21	.29	.21	--	.64	--	.07	.36	.93	.71
Hospital Pharmacy	.92	.92	.75	.25	.17	.25	.08	.58	.42	.17	--	.75	.67
X-ray	.66	.64	.62	.14	.12	.07	.03	.67	.22	.05	.15	--	.67
Practical Nursing	.54	.59	.59	.08	.09	.06	.03	.48	.15	.02	.12	.60	--

Table B-1

Probability Levels for the Coocurrence of Training Programs

Type \ Bed Increments	25-175	176-325	Over 326	Total
All Positions	24	203*	700	927
Rotating	24	199	509	732
Straight	0	2	191	193

*Inconsistencies as found in AMA and AOA information.

Table C-1

Frequency of Intern Positions in the
Sub-population of General Hospitals by Bed Increment

Bed Increment Type	25-175	176-325	Over 326	Total
All Positions	0	4	0	4
Rotating	0	0	0	0
Straight	0	4	0	4

Table C-2

Frequency of Intern Positions in the
Sub-population of Specialty Hospitals by Bed Increment

Table C-3

Frequency of Resident Positions in the Sub-population of General Hospitals by Bed Increment

Specialty \ Bed Increment	25-175	176-325	Over 326	Total
All Positions	38	241	1667*	1946*
General Practice	14	56	60	130
Medicine	3	47	308	358
OBGYN	0	15	141	156
Orthopedics	1	4	68	73
Pathology	0	25	145	170
Radiology	4	7	99	110
Surgery	5	57	293	355
Urology	0	0	37	37
Pediatrics	1	6	51	58
Anesthesia	10	20	96	126
Dermatology	0	0	25	25
Neurosurgery	0	0	17	17
Tuberculosis	0	0	0	0
Ophthalmology	0	2	49	51
Otology	0	0	99	99
PMR	0	0	42	42
Plastic Surgery	0	0	6	6
Psychiatry	0	0	56	56
Forensic Pathology	0	0	0	0
Neurology	0	0	33	33
Thoracic Surgery	0	0	19	19
Otolaryngology & Othorhinolaryngology	0	2	0	2
Occupational Medicine	0	0	0	0

*Inconsistencies as found in AMA & AOA information.

Table C-4

Frequency of Resident Positions in the Sub-population of Specialty Hospitals, by Bed Increment

Bed Increment Specialty	25-175	176-325	Over 326	Total
All Positions	21	53*	97*	171*
General Practice	0	0	0	0
Medicine	0	0	67	67
OBGYN	12	0	0	12
Orthopedics	0	4	0	4
Pathology	0	3	10	13
Radiology	0	0	5	5
Surgery	0	0	12	12
Urology	0	0	0	0
Pediatrics	0	18	0	18
Anesthesia	0	0	0	0
Dermatology	0	0	0	0
Neurosurgery	0	0	0	0
Tuberculosis	0	0	0	0
Ophthalmology	0	0	0	0
Otology	0	0	0	0
PMR	0	0	0	0
Plastic Surgery	0	0	0	0
Psychiatry	9	24	0	33
Forensic Pathology	0	0	0	0
Neurology	0	0	0	0
Thoracic Surgery	0	0	0	0
Otolaryngology Otorhinolaryngology	0	0	0	0
Occupational Medicine	0	0	0	0

*Inconsistencies as found in AMA and AOA information.

Rows / Columns	General Practice	Medicine	OBGYN	Orthopedics	Pathology	Radiology	Surgery	Urology	Pediatrics	Anesthesia	Dermatology	Neuro-surgery	Ophthalmology	Otology	PMR	Plastic Surgery	Psychiatry	Neurology	Thoracic Surgery	Otolaryngology
General Practice	-	.46	.50	.27	.55	.32	.50	.14	.05	.18	.0	0.	0.	0.	.05	.0	0	0	0	0
Medicine	.31	--	.56	.47	.72	.53	.84	.25	.31	.47	.13	.09	.22	.16	.09	.06	.09	.13	.13	.03
OBGYN	.42	.69	--	.42	.69	.42	.69	.31	.27	.42	.15	.08	.23	.19	.08	.04	.08	.12	.08	0
Orthopedics	.32	.79	.56	--	.90	.68	.90	.42	.37	.53	.21	.16	.32	.21	.16	.11	.16	.21	.21	.05
Pathology	.32	.62	.49	.46	--	.43	.68	.24	.27	.41	.11	.08	.16	.11	.08	.05	.08	.11	.11	.03
Radiology	.32	.77	.50	.59	.73	--	.86	.32	.36	.59	.18	.14	.32	.23	.14	.09	.14	.18	.14	.05
Surgery	.31	.75	.50	.47	.69	.53	--	.25	.28	.50	.11	.08	.19	.14	.08	.08	.08	.11	.08	.03
Urology	.33	.89	.89	.89	1.0	.78	1.0	--	.33	.56	.44	.22	.33	.44	.33	.22	.33	.44	.33	.0
Pediatrics	.68	.83	.58	.58	.83	.67	.83	.25	--	.75	.25	.17	.50	.33	.17	.17	.17	.25	.17	.08
Anesthesia	.17	.65	.48	.44	.65	.57	.78	.22	.39	--	.17	.13	.30	.22	.13	.13	.13	.17	.17	.04

Table D-1

Probability of the Co-Occurrence of Residency Specialties

Experimental Population Bed Increments	Total	General Hospitals	Specialty Hospitals
25-100	.8%	.3%	1.5%
101-175	.3%	---	1.5%
176-250	7.9%	1.3%	31.1%
251-325	1.9%	2.3%	---
326-400	5.5%	3.7%	10.5%
Over 400	84.1%	92.3%	54.7%

Table E-1

Percentage Distributions of the Total Number of Reported Research Projects in the Experimental Populations, by Bed Increments of 75.

Table F-1

Frequency of Reported Areas of Hospital-based Research in the Experimental Population of General Hospitals, By Bed Increment

Bed Increments / Areas of Research	25-175	176-325	Over 326	Total
Administration	0	1	4	5
Biomedical Research	0	1	2	3
Cardiovascular System	1	2	10	13
Clinical Pharmacology Pharmacology, Bio-chemistry	0	2	2	4
Connective Tissue Reaction	0	0	2	2
Diabetes	0	0	3	3
Digestive System	0	0	1	1
Endocrinology	0	0	0	0
Genetics & Cytology	0	2	3	5
Geriatrics	0	0	2	2
Hematology & Humoral System	0	2	7	9
Immunology	0	2	2	4
Infectious Diseases	0	0	2	2
Metabolism	0	0	5	5
Muscular Systems	0	0	2	2
Neoplasms, Cancerology	1	1	4	6
Nephrology	0	1	4	5
Neurology	0	0	2	2
Nuclear Medicine	0	0	1	1
Nursing	0	1	2	3
Nutrition	0	1	1	2
Obstetrics & Gynecology	0	0	2	2
Pathology	0	0	1	1
Pediatrics, Developmental Studies	0	1	2	3
Pulmonary System	0	2	4	6
Rehabilitation	0	0	1	1
Rheumatology	0	1	1	2
Surgery	0	1	1	2
Surgery of the Hand	0	0	0	0
Psychiatry & Psychology	0	0	1	1
Other	0	0	1	1

Table F-2

Frequency of Reported Areas of Hospital-based Research in the Experimental Population of Specialty Hospitals, By Bed Increment

Bed Increments Areas of Research	25-175	176-325	Over 326	Total
Administration	0	0	0	0
Biomedical Research	1	0	1	2
Cardiovascular System	0	0	2	2
Clinical Pharmacology	0	0	2	2
Pharmacology, Bio-chemistry				
Connective Tissue Reaction	0	0	0	0
Diabetes	0	0	0	0
Digestive System	0	0	2	2
Endocrinology	0	0	1	1
Genetics & Cytology	0	1	0	1
Geriatrics	0	0	0	0
Hematology & Humoral System	0	0	2	2
Immunology	1	0	1	2
Infectious Diseases	0	0	1	1
Metabolism	0	0	1	1
Muscular Systems	0	0	0	0
Neoplasms, Cancerology	0	0	2	2
Nephrology	0	0	2	2
Neurology	0	1	2	3
Nuclear Medicine	0	0	2	2
Nursing	0	0	0	0
Nutrition	0	0	1	1
Obstetrics & Gynecology	1	0	0	1
Pathology	0	0	1	1
Pediatrics, Developmental Studies	0	0	0	0
Pulmonary System	0	0	1	1
Rehabilitation	1	0	0	1
Rheumatology	0	0	0	0
Surgery	0	0	1	1
Surgery of the Hand	0	0	1	1
Psychiatry & Psychology	1	1	2	4
Other	0	0	0	0

Table G-1

Percentage Occurrence of Specified Facilities on General Hospitals, By Bed Increment

Bed Increment Facilities	25-175	176-325	Over 326
Anesthesia	75%	97%	100%
Autopsy	58%	100%	100%
Blood Bank	72%	86%	97%
Cancer Registrar	19%	63%	86%
Cardiology Unit	20%	51%	81%
Chapel	49%	89%	97%
Clinical Laboratory	96%	100%	100%
Cobalt Therapy	3%	14%	49%
Delivery Room	80%	89%	95%
Dental	24%	49%	65%
Dietary (with Dietitian)	86%	100%	100%
Electrocardiography	95%	100%	100%
Electroencephalography	18%	43%	92%
Organized Emergency Dept.	74%	94%	100%
Extended Care	5%	9%	8%
Family Planning	0%	6%	24%
Home Care	3%	3%	14%
Organized Hospital Aux.	85%	97%	86%
Intensive Care Unit	13%	63%	89%
Medical Library	86%	100%	100%
Medical Records	97%	100%	100%
Medical Social Service	4%	34%	70%
Occupational Therapy	5%	14%	62%
Operating Room	96%	100%	100%
Organized Outpatients Clinic	12%	57%	86%
Pathology Laboratory	70%	100%	100%
Pharmacy	63%	100%	100%
Physical Therapy	45%	89%	100%
Post Operative Recovery Room	74%	100%	100%
Premature Nursery	65%	89%	95%
Psychiatric Inpatient	3%	14%	59%
Radioactive Isotopes	26%	80%	95%
Radium Therapy	32%	66%	89%
Rehabilitation	3%	14%	27%
X-ray, diagnostic	96%	100%	100%
X-ray, routine on admission	51%	40%	51%
X-ray, therapeutic	27%	94%	100%

Table G-2

Percentage Occurrence of Specified Facilities on Specialty Hospitals, by Bed Increment

Bed Increment / Facilities	25-175.	176-325	Over 326
Anesthesia	28%	60%	38%
Autopsy	32%	60%	38%
Blood Bank	20%	40%	13%
Cancer Registrar	4%	20%	0%
Cardiology Unit	0%	40%	0%
Chapel	56%	60%	38%
Clinical Laboratory	84%	80%	50%
Cobalt Therapy	0%	0%	0%
Delivery Room	24%	0%	0%
Dental	60%	60%	50%
Dietary (with Dietitian)	88%	80%	38%
Electrocardiography	80%	80%	50%
Electroencephalography	16%	40%	25%
Organized Emergency Dept.	8%	40%	25%
Extended Care	28%	0%	25%
Family Planning	8%	20%	13%
Home Care	12%	0%	13%
Organized Hospital Aux.	40%	40%	13%
Intensive Care Unit	8%	40%	0%
Medical Library	92%	80%	50%
Medical Records	92%	80 %	50%
Medical Social Service	64%	80 %	25 %
Occupational Therapy	56%	60 %	50 %
Operating Room	56%	80 %	50%

Bed Increment / Facilities	25-175	176-325	Over 326
Organized Outpatients Clinic	72%	80%	38%
Pathology Laboratory	24%	60%	25%
Pharmacy	56%	80%	25%
Physical Therapy	32%	40%	50%
Post-operative Recovery Room	28%	60%	13%
Premature Nursery	20%	20%	0%
Psychiatric Inpatient	12%	0%	13%
Radioactive Isotopes	8%	0%	13%
Radium Therapy	8%	0%	0%
Rehabilitation	32%	0%	13%
X-ray, diagnostic	92%	60%	50%
X-ray, routine on admission	72%	60%	38%
X-ray therapeutic	0%	40%	13%

Continuation of Table G-2

Table H-1

Percentage Occurrence of Organized Clinics in the Outpatient Departments of General Hospitals, by Bed Increment

Bed Increments Clinics	25-175	176-325	Over 326
Cancer	3%	20%	62%
Dentistry	2%	6%	49%
Dermatology	2%	20%	62%
EENT	3%	26%	68%
Geriatrics	0%	14%	11%
Gynecology	4%	43%	92%
Internal Medicine	3%	46%	92%
Mental Hygiene	1%	0%	16%
Neurology	1%	11%	54%
Obstetrics	4%	46%	81%
Orthopedics	10%	34%	76%
Pediatrics	3%	37%	62%
Physical Medicine	2%	20%	43%
Psychiatry	0%	3%	38%
Surgery	3%	43%	89%
Tuberculosis	2%	0%	14%
Urology	7%	23%	65%
Well Child	3%	17%	43%
Deliveries and Complications of Pregnancies	0%	0%	8%
Diseases of the Respiratory System	0%	3%	14%
Diseases of the Digestive System	0%	[illegible]	19%
Injuries from Chemicals	1%	0%	3%
Diseases of the Genito-urinary System	0%	3%	8%
Diseases of the Circulatory System	0%	3%	27%
Neoplasms	0%	3%	3%
Diseases of the Nervous System	1%	6%	19%
Diseases of Bones & Organs of Movement	0%	0%	30%
Allergenic, etc. Diseases	0%	11%	30%
Infective & Parasitic Diseases	0%	3%	0%
Mental Disorders	1%	0%	11%
Connective Tissue Diseases	0%	0%	3%
Congenital Malformation	0%	0%	8%
Pediatric Clinic	0%	6%	0%
Dental Clinic	0%	0%	0%
Advisory Units	0%	0%	5%
Home Services	0%	0%	0%
Laboratory	1%	6%	22%

Table H-2

Percentage Occurrence of Organized Clinics in The Outpatient Departments of Specialty Hospitals, By Bed Increment

Bed Increments Clinics	25-175	176-325	Over 326
Cancer	4%	20%	0%
Dentistry	4%	40%	13%
Dermatology	0%	40%	13%
EENT	4%	40%	13%
Geriatrics	8%	20%	13%
Gynecology	8%	20%	13%
Internal Medicine	4%	60%	13%
Mental Hygiene	8%	0%	0%
Neurology	16%	40%	0%
Obstetrics	12%	0%	0%
Orthopedics	8%	40%	13%
Pediatrics	4%	40%	0%
Physical Medicine	12%	20%	25%
Psychiatry	8%	40%	0%
Surgery	0%	60%	25%
Tuberculosis	44%	40%	19%
Urology	0%	60%	13%
Well Child	4%	40%	0%
Deliveries and Complications of Pregnancies	0%	0%	0%
Diseases of the Respiratory System	4%	0%	0%
Diseases of the Digestive System	0 %	0%	0%
Injuries from Chemicals	0 %	20%	0%
Diseases of the Genito-urinary System	0 %	20%	0%

Bed Increments Clinics	25-175	176-325	Over 326
Diseases of the Circulatory System	0%	40%	0%
Neoplasms	0%	20%	0%
Diseases of the Nervous System	4%	40%	0%
Diseases of Bones & Organs of Movement	8%	0%	0%
Allergenic, etc. Diseases	8%	40%	0%
Infective & Parasitic Diseases	0%	0%	0%
Mental Disorders	0%	20%	0%
Connective Tissue Diseases	4%	20%	0%
Congenital Malformations	4%	20%	0%
ediatric Clinic	4%	0%	0%
Dental Clinic	0%	0%	0%
Advisory Units	0%	0%	0%
Home Services	0%	0%	0%
Laboratory	0%	20%	0%

Continuation of Table H-2

Bed Increment Category	25-175	176-325	Over 326	Total
Administrative	2,027	1,851	3,569	7,447
Dietary	2,508	2,115	4,960	9,583
Nursing Education	99	348	837	1,284
Plant Operation & Maintenance	3,028	2,779	6,944	12,751
Direct Patient Care	13,531	12,288	29,996	55,816
Total	20,996	20,097	46,431	87,224

Table I-1

Total Numbers of Hospital Personnel by
Category of Employment and by Bed Increment*

*Data taken from the Annual Hospital Registration Report. It is incomplete (9 hospitals not reporting, 3 reporting incompletely) and inconsistent.

Bed Increments				
Categories	25-175	176-325	Over 326	Total
Medical & Surgical	227	474	1,949	2,650
Nursing Service	8,323	7,060	15,704	31,087
Operating Room	743	774	1,549	3,066
Delivery Room	588	403	823	1,814
Nursery	328	438	1,103	1,869
Radiology	581	593	1,198	2,372
Laboratory	788	966	2,314	4,068
Blood Bank	24	45	170	239
Electrocardiography	68	75	178	321
Electroencephalography	11	13	85	109
Pharmacy	143	169	417	729
Anesthesiology	72	52	234	358
Central Supply	356	473	976	1,805
Medical Records	429	353	687	1,469
Social Service	29	29	241	299
Emergency Room	242	399	708	1,349
Physical Medicine	110	175	533	818
Dental Personnel	23	6	54	83
Medical Library	14	23	92	129
Outpatient	40	99	536	675
Psychiatry	84	84	597	765

Table I-2

Breakdown of Hospital Personnel Involved in
Direct Patient Care Activities by Bed Increment